PATENT

Atty Docket No.: 10003526-1
App. Ser. No.: 09/843,930

REMARKS

Favorable reconsideration of this application is respectfully requested in view of the claim amendments and following remarks. Claims 1-22 are pending in the present application of which claims 1, 10 and 19 are independent. Claim 19 has been amended. Claims 21-22 have been added. No new matter has been added.

Claims 19-20 stand rejected under 35 U.S.C. § 101 as allegedly being directed to non-statutory subject matter. Claims 1-10 and 19-20 stand rejected under 35 U.S.C. § 102(b) as allegedly being anticipated by Lee et al. ("An Analytic Performance Model of Disk Arrays", SIGMETRICS, 1993, pages 98-109) ("Lee et al."). Claims 1, 4-6, 9-10 and 19-20 stand rejected under 35 U.S.C. § 102(b) as allegedly being anticipated by Shriver et al. ("An Analytic Behavior Model for Disk Drives with Readahead Caches and Request Reordering", SIGMETRICS, 1998, pages 182-191) ("Shriver et al.") or Lynch et al. (U.S. Patent No. 6,002,854) ("Lynch et al."). Claims 2-3 and 7-8 stand rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over Shriver et al. or Lynch et al. in view of Lee et al. These rejections are respectfully traversed for at least the following reasons.

Drawings

At the outset, the indication that the drawings filed on April 30, 2001 have been accepted is noted with appreciation.

Claim Objections

The Office Action objected to claims 11-18 as being dependent upon a rejected base claim, but the Office Action states that claims 11-18 would be allowable if rewritten in

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independent form including all of the features of the base claim and any intervening claims. The Office Action further states

> "The prior art of record *does not disclose or suggest* combination of hierarchy, constraints, and transforms, in the context of the claims." (Office Action, page 6)

Claim 10 recites a method for predicting performance of a system that includes a plurality of interconnected components defining at least one data flow path, the method comprising "specifying a workload specification for the system," "modeling the system using one or more component models," and "operating on the workload specification by at least some of the component models along the data flow path." For at least the reasons set forth below, with regard to traversal of the rejections of claim 10 under 35 U.S.C. § 102(b), claim 10 is believed to be in condition for allowance. Because claims 11-18 incorporate all the features of claim 10, claims 11-18 are also believed to be in condition for allowance. The Applicants therefore respectfully request withdrawal of the objection.

Claim Rejection under 35 U.S.C. 101

The test for determining whether an invention is directed to statutory subject matter under 35 U.S.C. § 101 is whether the claimed invention as a whole accomplishes a practical application (MPEP 2106). As noted by the Court of Appeals for the Federal Circuit in *State Street*, 47 USPQ2d at 1601-02 (Fed. Cir. 1998), the claimed invention must produce a "useful, concrete and tangible result."

Claims 19-20 stand rejected under 35 U.S.C. § 101 as allegedly being directed to non-statutory subject matter. This rejection is respectfully traversed.

Claim 19, as amended, now recites a "computer readable medium on which is embodied content *that, when executed, is used by a computer system* in predicting

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performance of a system that includes a plurality of interconnected components defining at least one data flow path." The Applicants submit that the claimed "computer readable medium on which is embodied content that, when executed, is used by a computer system" as recited in claims 19-20 is directed to statutory subject matter under 35 U.S.C. § 101.

The functions of the claimed computer readable medium have practical applications which produce a useful, concrete and tangible result. Specifically, the claimed computer readable medium embodies executable content, wherein the executable content comprises "data specifying a workload for the system," "data modeling the system using one or more component models," and "instructions for operating on the workload specification by at least some of the component models along the data flow path" which, taken as a whole, produce a useful, concrete and tangible result, namely "*a computer readable medium on which is embodied content that, when executed, is used by a computer system in predicting performance of a system that includes a plurality of interconnected components defining at least one data flow path.*" In addition, the claimed computer readable medium on which is embodied content is tangibly embodied and executed by a piece of hardware, i.e. the computer readable medium is used by a computer system which is a tangible piece of hardware. Furthermore, the functions of the claimed data specifying a workload for the system, the data modeling the system using one or more component models, and the instructions for operating on the workload specification *taken as a whole* also accomplishes a practical application which produces a useful, concrete and tangible result as required under *State Street*. Specifically, the claimed components function as executable content in "predicting performance of a system that includes a plurality of interconnected components defining at least one data flow path" as *used by a computer system*. For at least the reasons

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set forth above, the Applicants submit that claims 19-20 are directed to statutory subject matter, and thus comply with the requirements of 35 U.S.C. § 101. Applicants therefore respectfully request withdrawal of the rejection.

Claim Rejection under 35 U.S.C. 102

The test for determining if a reference anticipates a claim, for purposes of a rejection under 35 U.S.C. § 102, is whether the reference discloses all the elements of the claimed combination, or the mechanical equivalents thereof functioning in substantially the same way to produce substantially the same results. As noted by the Court of Appeals for the Federal Circuit in *Lindemann Maschinenfabrick GmbH v. American Hoist and Derrick Co.*, 221 USPQ 481, 485 (Fed. Cir. 1984), in evaluating the sufficiency of an anticipation rejection under 35 U.S.C. § 102, the Court stated:

> Anticipation requires the presence in a single prior art reference disclosure of each and every element of the claimed invention, arranged as in the claim.

Therefore, if the cited reference does not disclose each and every element of the claimed invention, then the cited reference fails to anticipate the claimed invention and, thus, the claimed invention is distinguishable over the cited reference.

Rejection of Claims 1-10 and 19-20 under 35 U.S.C. § 102(b) over Lee et al.

The Office Action sets forth a rejection of claims 1-10 and 19-20 under 35 U.S.C. § 102(b) as being allegedly anticipated by Lee et al. ("An Analytic Performance Model of Disk Arrays", SIGMETRICS, 1993, pages 98-109) ("Lee et al."). This rejection is respectfully traversed.

Lee et al. discloses an analytic performance model of a disk array (Abstract). According to Lee et al., analytic performance models of disk arrays are difficult to formulate

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due to the presence of queuing and fork-join synchronization. (Abstract). Lee et al. also discloses that, with regard to the analytic performance model, the workload model "is not expressive enough to easily model real workloads." (page 99). In addition, Lee et al. disclose that the performance model is only used to model a disk array system (Introduction; pages 98-99).

Claim 1 recites a method for constructing a model useful for predicting performance of a system that includes a plurality of interconnected components defining at least one data flow path" and "modeling the system using one or more component models." Claim 1 further recites "each component model arranged in like relationship to the data flow path as the selected one or more of the components represented by the component model."

Lee et al. fails to teach "modeling the system using one or more component models" wherein each component model is "arranged in like relationship to the data flow path as the selected one or more of the components represented by the component model" as recited in claim 1. Instead, Lee et al. discloses a model of requests received by a disk array, and using factors, such as disk idle time between disk requests and response time of a given array request (pages 102-103). Lee et al. discloses a single model for the entire disk array system, and not a system which is modeled using one or more component models. Furthermore, Lee et al. fails to teach component models arranged in like relationship to a data flow path.

Claim 1 also recites wherein each component model comprises "a constraint upon the workload specification input to that component model" or "a transformer of the workload specification input to that component model so as to result in one or more output workloads that are input workload specifications to subsequent component models along the data flow path" or "both a constraint and a transformer."

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Lee et al. also fails to teach modeling a system using one or more component models, wherein each component model is "a constraint upon the workload specification input to that component model," "a transformer of the workload specification input to that component model," or "both a constraint and a transformer." Instead, Lee et al. discloses a closed queuing system consisting of L number of processes, wherein each process issues an array request (page 100). In addition, Lee et al. discloses factors used in metrics analysis, as noted above. In addition, Lee et al. discloses an array request "broken up into n disk requests" (page 100). Lee et al., however, fails to teach that either the factors or the disk request constitute *component models* used in modeling a system, wherein each component model is *a constraint or a transformer*. Instead, the factors disclosed by Lee et al. are used in metrics analysis for evaluating the requests received by a disk array. For at least these reasons, Lee et al. fails to teach modeling a system using one or more component models, wherein each component model is a constraint upon a workload specification input to that component model, a transformer of the workload, or both a constraint and a transformer.

Claims 10 and 19 each recite similar features as claim 1. In particular, claims 10 and 19 each recite "each component model arranged in like relationship to the data flow path as the selected one or more of the components represented by the component model." In addition, claims 10 and 19 each recite wherein each component model is "a constraint upon the workload specification input to that component model," "a transformer of the workload specification input to that component model," or "both a constraint and a transformer." For at least the reasons set forth above, with regard to claim 1, Lee et al. fails to teach the features of claims 10 and 19.

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The rejection cites sections 2, 3 and 4 of Lee et al., and paraphrases these sections of Lee et al. stating that

> "Lee et al. disclose performance modeling of disk arrays, including RAID systems (section 2), component modeling (section 3), calibration and verification/validation (section 4)." (Office Action, page 3)

It appears that the rejection is alleging that Lee et al. discloses performance modeling of disk arrays, including component modeling.

The rejection appears to be unsupported by the disclosure of Lee et al. Specifically, Lee et al. discloses and describes factors, such as disk idle time between disk requests, response time of a given array request, and probability of a request accessing a given disk, used in modeling requests received by a disk array (page 100). Lee et al. also discloses metrics for error analysis of an analytic model (page 102). Lee et al., however, fails to teach one or more component models, wherein each component model is a constraint upon a workload specification input to that component model, a transformer of the workload, or both a constraint and a transformer. In addition, the Office Action states that "the prior art of record does not disclose or suggest combination of hierarchy, constraints, and transforms, in the context of the claims." (page 6, Office Action). Thus, the Office Action acknowledges the failure of Lee et al. to disclose a constraint or a transformer, as recited in the claims.

Because claims 2-9 incorporate all the features of claim 1, and because claim 20 incorporates all the features of claim 19, Lee et al. fails to teach the invention claimed in claims 1-10 and 19-20 for at least the reasons given above. Therefore, Lee et al. does not anticipate the subject matter of claims 1-10 and 19-20. Claims 1-10 and 19-20 are thus allowable over Lee et al., and withdrawal of the rejection is respectfully requested.

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Rejection of Claims 1, 4-6, 9-10 and 19-20 under 35 U.S.C. § 102(b) over Shriver

The Office Action also sets forth a rejection of claims 1, 4-6, 9-10 and 19-20 under 35 U.S.C. § 102(b) as being allegedly anticipated by Shriver et al. ("An Analytic Behavior Model for Disk Drives with Readahead Caches and Request Reordering", SIGMETRICS, 1998, pages 182-191) ("Shriver et al."). This rejection is also respectfully traversed.

Shriver et al. discloses an analytic model for disk drives with readahead caches and request reordering (Abstract). According to Shriver et al., a storage device is modeled by modeling a request queue, a cache and a disk mechanism." (page 182).

The features of claims 1, 10 and 19 are set forth above.

Shriver et al. fails to teach predicting performance of a system that includes a plurality of interconnected components defining at least one data flow path, comprising "modeling the system using one or more component models," and *"wherein at least one of the component models comprises a constraint."* In addition, Shriver et al. fails to teach wherein each component model is "*a constraint* upon the workload specification input to that component model." Instead, Shriver et al. discloses modeling a storage device by modeling a request queue, a cache and a disk mechanism." (page 182). Shriver et al. fails to teach that the request queue, the cache and the disk mechanism constitute component models and *"wherein at least one of the component models comprises a constraint,"* as recited in claims 1, 10 and 19. Instead, Shriver et al. disclose service time *predictions*, and not constraints, for individual components of a storage device. (Shriver, page 182) Nowhere does Shriver et al. disclose a model of a system using one or more component models, further "wherein at least one of the component models comprises a constraint," as recited in claims 1, 10 and 19.

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The rejection cites sections 2, 3, 4 and 5 of Shriver et al. and paraphrases these sections stating

> "Shriver et al. disclose performance modeling of disks, component modeling and workload specifications (sections 2-3), models (section 4), calibration and verification/validation (section 5)." (Office Action, page 3)

It appears the rejection is alleging that Shriver et al. discloses performance modeling using the component models recited in claims 1, 10 and 19.

The rejection appears to be unsupported by the disclosure of Shriver et al. Specifically, Shriver et al. discloses modeling a storage device by modeling a request queue, a cache and a disk mechanism." (page 182). Shriver et al. fails to teach, however, that a request queue, a cache and a disk mechanism constitute "a constraint," "a transformer" or "both a constraint and a transformer," and "*wherein at least one of the component models comprises a constraint,*" as recited in claims 1, 10 and 19. Instead, Shriver et al. disclose a model of a disk drive based on "performance predictions" and "service time predictions" and not a model using one or more component models comprising constraints. Furthermore, Shriver et al. fails to teach a workload specification for a system that includes a plurality of interconnected components, and "*operating on* the workload specification by at least some of the component models." Instead, the service time predictions and "attributes" disclosed by Shriver et al. are used in *predicting* and *describing* disk drive performance, respectively Shriver et al., pages 182, 184). Neither the service time predictions or the attributes disclosed by Shriver et al. are used for *operating on* a workload specification.

Because claims 4-6 and 9 incorporate all the features of claim 1, and because claim 20 incorporates all the features of claim 19, Shriver et al. fails to teach the invention claimed in claims 1, 4-6, 9-10 and 19-20 at least for the reasons given above. Therefore, Shriver et al.

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does not anticipate the subject matter of claims 1, 4-6, 9-10 and 19-20. Claims 1, 4-6, 9-10 and 19-20 are thus allowable over Shriver et al., and withdrawal of the rejection is respectfully requested.

Rejection of Claims 1, 4-6, 9-10 and 19-20 under 35 U.S.C. § 102(b) over Lynch

The Office Action also sets forth a rejection of claims 1, 4-6, 9-10 and 19-20 under 35 U.S.C. § 102(b) as being allegedly anticipated by Lynch et al. (U.S. Patent No. 6,002,854) ("Lynch et al."). This rejection is also respectfully traversed.

Lynch et al. discloses a generative approach for configuring systems such that a system may be configured based on component or resource requests, or input in the form of need. (Abstract) According to Lynch et al., a structural model provides an ability to identify logical data type and physical interconnections between elements and establish connections between elements. (Abstract)

The features of claims 1, 10 and 19 are set forth above.

Lynch et al. fails to teach predicting performance of a system that includes a plurality of interconnected components defining at least one data flow path, comprising "specifying a workload specification for the system," and "modeling the system using one or more component models," wherein each component model is "a constraint upon the workload specification input to that component model," "a transformer of the workload specification input to that component model so as to result in one or more output workload specifications that are input workload specifications to subsequent component models along the data flow path," or "both a constraint and a transformer, and wherein at least one of the component models is a constraint." Instead, Lynch et al. disclose generating a graphic representation of physical and spatial locations of components of a configured system. (column 5, lines 15-25).

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The rejection cites Figures 2, 5-7, 12 and "corresponding text" of Lynch et al. and states that Lynch et al. discloses

> "a generative approach for configuring systems such that a system may be configured based on component or resource requests, or input in the form of need. The *present invention* provides a constraint-based configuration system using a structural model hierarchy. The structural aspects of the model provide the ability to define a model element as being contained in, or by, another model element. In addition, the structural model provides the ability to identify logical data type and physical interconnections between elements and establish connections between elements. To configure a system, the *present invention* accepts input in the form of requests (e.g., component or resource) or needs, such as an expression of a need for a desktop computer system to be used in a CAD (i.e., computer-aided design) environment. Using this information, the *present invention* configures a system by identifying the resource and component needs, constraints imposed on or by the resources or components identified, and the structural aspects of the system." (Office Action, pages 3-4)

Initially, Applicants note that the Office Action refers repeatedly to "the present invention," although the above-cited statement from the Office Action do not correspond at all with the claims of Applicants' present invention. Applicants' respectfully request clarification of what is meant by the "present invention," on page 3 of the Office Action.

In addition, the rejection of claims 1, 4-6, 9-10 and 19-20 appears to be unsupported by the disclosure of Lynch et al. Specifically, Lynch et al. fails to teach predicting performance of a system that includes a plurality of interconnected components defining at least one data flow path, comprising "modeling the system using one or more component models," wherein each component model is "a constraint upon the workload specification input to that component model," "a transformer of the workload specification input to that component model," or "both a constraint and a transformer, and wherein at least one of the component models is a constraint." Instead, Lynch et al. discloses an approach for

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configuring systems based on resource requests, and not an approach for modeling a system using one or more component models, as recited in claims 1, 10 and 19.

Because claims 4-6 and 9 incorporate all the features of claim 1, and because claim 20 incorporates all the features of claim 19, Lynch et al. fails to teach the invention claimed in claims 1, 4-6, 9-10 and 19-20 for at least the reasons given above. Therefore, Lynch et al. does not anticipate the subject matter of claims 1, 4-6, 9-10 and 19-20. Claims 1, 4-6, 9-10 and 19-20 are thus allowable over Lynch et al., and withdrawal of the rejection is respectfully requested.

Claim Rejection Under 35 U.S.C. §103

The test for determining if a claim is rendered obvious by one or more references for purposes of a rejection under 35 U.S.C. § 103 is set forth in MPEP § 706.02(j):

> To establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations. The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art and not based on applicant's disclosure. *In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991).

Therefore, if the above-identified criteria are not met, then the cited reference(s) fails to render obvious the claimed invention and, thus, the claimed invention is distinguishable over the cited reference(s).

The Office Action sets forth a rejection of claims 2-3 and 7-8 under 35 U.S.C. 103(a) as allegedly being unpatentable over Shriver et al. or Lynch et al. in view of Lee et al. This rejection is respectfully traversed.

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The deficiencies of Shriver et al., Lynch et al. and Lee et al. are set forth above. For at least the reasons set forth above, neither Shriver et al., Lynch et al. nor Lee et al. teach or suggest the features of independent claim 1, and thus dependent claims 2-3 and 7-8 are believed to be allowable.

With regard to claims 2-3 and 7-8, the Office Action states "the base references do not expressly disclose that the intended use is for disk arrays." (Office Action, page 5) The rejection also cites sections 2, 3 and 4 of Lee et al., and paraphrases these sections stating:

> "Lee et al. disclose performance modeling of disk arrays, including RAID systems (section 2), component modeling (section 3), calibration and verification/validation (section 4)." (Office Action, page 5)

The rejection further alleges that

> "It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the base references to extend the modeling from single disks to disk arrays." (Office Action, page 5)

However, given that neither Shriver et al., Lynch et al. or Lee et al. teach or suggest the features of independent claim 1, for at least the reasons set forth above, the rejection of claims 2-3 and 7-8 appears unsupported by the cited references. The Office Action provides no specific teaching by Shriver et al., Lynch et al. or Lee et al., whether alone or in combination, to support the rejection. In addition, given the deficiencies of Lee et al., at least for the reasons set forth above, Lee et al. fails to remedy the deficiencies of Shriver et al. or Lynch et al., and Applicants respectfully request withdrawal of the rejection.

Newly Added Claims

Claims 21-22 have been added. Claims 21 and 22 each recite a plurality of components instead of one or more components. These claims are also directed to using at

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least one component model for each of the components and each component model arranged in like relationship to the data flow path of the plurality of components in the system. None of these features are taught or suggested by the prior art. Therefore, the Examiner is respectfully requested to allow claims 21-22.

Conclusion

In light of the foregoing, withdrawal of the rejections of record and allowance of this application are earnestly solicited. Should the Examiner believe that a telephone conference with the undersigned would assist in resolving any issues pertaining to the allowability of the above-identified application, please contact the undersigned at the telephone number listed below. Please grant any required extensions of time and charge any fees due in connection with this request to deposit account no. 08-2025.

Respectfully submitted,

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Dated: March 23, 2005 By

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